

# MONTANA ENERGY OFFICE

Energy Return on Investment for Wind





# Short Answer

Question: Do wind farms take more energy to construct than they will produce?

Answer: No.



# What is EROI?

Energy Return on Investment

$$\text{EROI} = \frac{\text{cumulative electricity generated}}{\text{cumulative primary energy required}}$$



# Some Studies

*Meta-analysis of net energy return for wind power systems. Kubiszewski et. al. (2009)*

- Surveyed 119 wind turbines constructed from 1977- 2007.
- All turbines under 1 MW
- Average EROI of 18 for constructed projects



# Some Studies

*EROI of Global Energy Resources:  
Preliminary Status and Trends. Lambert,  
Hall, et al. (2012)*

- Analyzed EROI for various fuels based on year and location.
- Reviewed 26 studies on wind EROI concluded average global value of 20



# Some Studies

*Comparative life cycle assessment of 2.0 MW wind turbines. Haapala et al. (2014)*

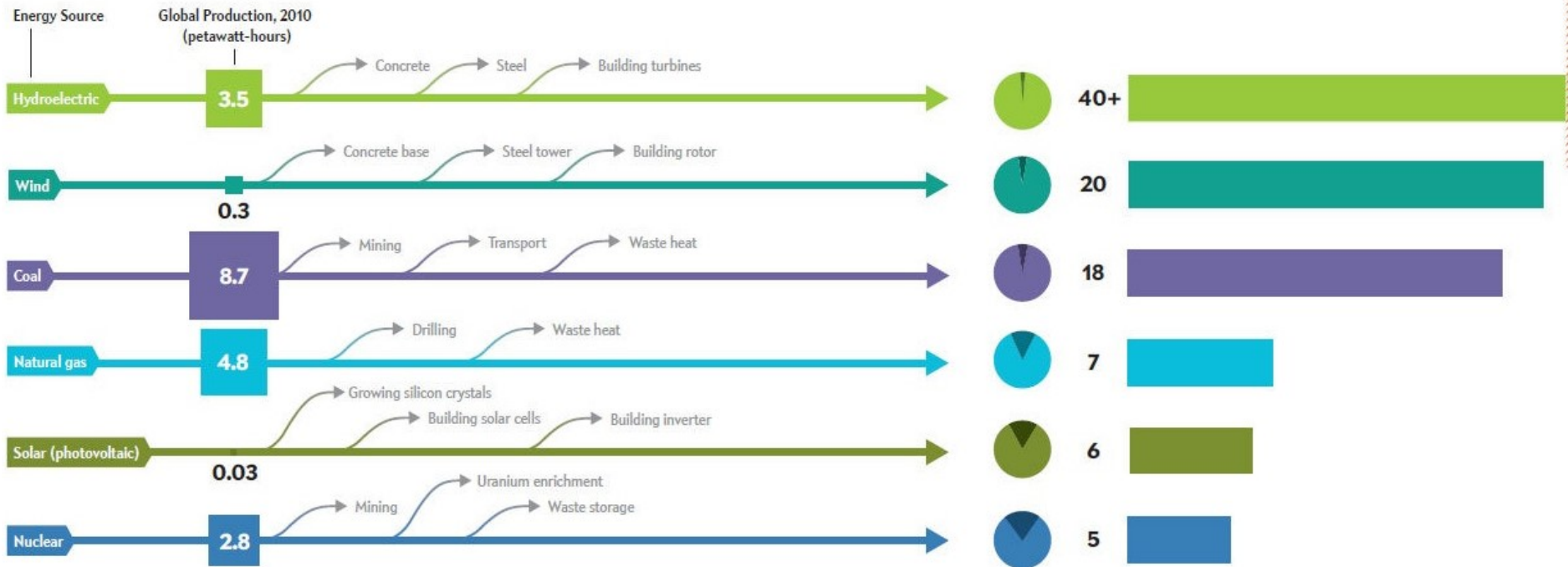
- 2.0 MW turbines installed in Oregon.

- Energy breakeven point at 5.2 and 6.4 months looking at two different turbine models

# Scientific American Article (2013)

## ELECTRIC POWER: Renewables Are Competitive with Fossil Fuels

Sources of electricity span a wide range of EROIs. Values are recent industry averages or from typical installations. Renewables do not include energy storage.





# Final Thoughts

- Environmental, economic, and social costs/benefits to every type of energy
- MT requires decommissioning planning and bonding of wind and solar facilities over a certain size
- MT law allows for counties to levy an impact fee on wind
- MT law allows local governments to provide a property tax incentive of 50% (or 75%) for the 5 years